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Secretary Shultz

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The Shape, Scope, and Consequences of the Age of Information

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Following is an address by Secretary Shultz before the Stanford University Alumni Association's first International Conference, Paris, March 21, 1986.

I'm always pleased to be in Paris. And I'm especially pleased to be here when the centennial celebration of the Statue of Liberty is only a few months away. That engineering marvel of the 19th century is an apt symbol of my theme tonight—the relationship between the advance of technology and the advance of liberty. For 100 years, that statue has been a beacon to mankind and a testimony to the unbreakable bond between our nations. On behalf of Americans everywhere, I extend our appreciation and deepest affections to France.

I'm also pleased to be speaking as the Secretary of State from Washington to an audience of ex-Californians, Parisians, and other Europeans at a meeting organized by Stanford University. Tonight's gathering is an appropriate setting for my subject: the shape, scope, and consequences of the age of information. Geography and borders have always constrained everyday life. Today, the information revolution is undermining their ancient dictates. It is shifting the balance of wealth and strength among nations, challenging established institutions and values, and redefining the agenda of political discourse.

The information revolution promises to change the routine of our planet as decisively as did the industrial revolution of the past century. The industrial age is now ending. In some places, it has already passed. The United States and most of the free nations in the developed world are already seeing how the age of information is transforming our economies. A century ago, we moved from an agricultural to an industrial phase in our development. Today, we remain agriculturally and industrially productive; but the basis of our economy is shifting rapidly from industrial production to information-based goods and services. Our economic indices—such as productivity and the structure of employment—are being decisively altered by our entry into the new age.

Yet these changes have been so pervasive, and their pace so rapid, that we have been unable to comprehend them in their full scope. We are very much like the leaders of the early 19th century as they tried to grasp the unfolding consequences of industrialization. No one has taken the full measure of our own new age. But if we are to seize the opportunities and understand the problems that this new phase of technological transformation will bring, we must try to grasp both its particulars and its broad outlines.

Dimensions of the New Age

What is the information age? The answers to that question are as numerous as the age itself is pervasive. There is, most obviously, a scientific dimension. Our thinking about our physical environment is changing with unprecedented speed. That change has been reflected most dramatically in our technological prowess—particularly in the development, storage, processing, and transfer of information. While the industrial age found its proper symbol in the factory, the symbol of the information age might be the computer, which can hold all the information contained in the Library of Congress in a machine the size of a refrigerator. Or its proper symbol may be a robot, a machine capable of supplementing age-old manual labor and liberating human beings from the most arduous and repetitive of tasks. Or perhaps its symbol is the direct broadcast satellite, which can send television programs directly into homes around the globe.

This list does not begin to capture the variety or capacity of these new technologies. Indeed, these are only the beginnings of what will be far-reaching and profound technical developments. Two decades from now, our computers will be 1,000 times more powerful than they are today. In a few short years, the most advanced technology of 1985 will seem as obsolete to us as the transistor—which made its debut some 40 years ago—seems today. Our scientific advances are affecting everything from the biological sciences to national defense. The President's Strategic Defense Initiative (SDI), with its promise of making deterrence more stable by reducing reliance on offensive nuclear weapons, is one dramatic example of the impact of intellectual and scientific change on our ways of dealing with the world. SDI can well be described, in fact, as a gigantic information processing system.

The economic dimension of this new age is just as revolutionary as its scientific and technological counterparts. Information, as Walter Wriston observed years ago, is our new international standard. Fortunes rise and fall according to its dissemination. With the advent of "real time" transfers of information, an announcement made in the Rose Garden can be reflected 2 minutes later in the stock market in Singapore. The information age is bringing a new conception of economic efficiency not just to entrepreneurs, and not just to corporations, but to the entire global market.

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These and other economic consequences of the new age are transforming the way nations trade with one another. They are bringing new uncertainties to the marketplace and to the politics of regulation. Across the globe, the foreign policy agenda reflects new economic disputes as developing and advanced nations alike struggle to come to grips with transborder data flows, technology transfers, satellite transmissions, and the crowding of the radio spectrum. Some of these disputes are between governments. Others are between governments and private corporations. U.S. computer manufacturers, for example, are now disputing with several European governments over the issue of transborder data transfers. The U.S. companies believe that they should be allowed to compile data and have market access rights, while some governments believe that the data should be centrally controlled. Like the technologies themselves, the disputes created by the permeability of geographical borders to information flows are growing at a rapid rate.

Yet, these economic disputes are only one example of the effects of information technologies on international relations. The proliferation of information has also sparked new concerns over national security. Information is intrinsically neutral. It can be used for multiple purposes, good and bad. Governments everywhere are finding it harder to control the flow of sensitive information in the critical areas of intelligence and national defense. In free countries, where openness is valued in its own right, we must be careful not to underestimate the ability of others to manipulate new technologies for repressive purposes. In the TWA hijacking and in other such incidents, for instance, terrorists exploited our open system of mass communication to create a global forum for their brutal acts.

The social dimension of the information age may seem more intangible, but it is equally profound. More than 6 million American homes now have personal computers. By 1990, according to some estimates, half of all our households—and an untold number of our schools, offices, and factories—will be computerized. The impact of that change on our young people is already extraordinary. Their attachment to now commonplace video games and to video cassettes is a symbol of adaptation to the new age. Whole generations are now growing up with the computer, taking it for granted, understanding its languages, and using it with ease. What does their nonchalance imply? I was thinking of this recently as I watched my granddaughter play with a computerized toy. To her generation, the technologies of tomorrow will be as integral to her lifestyle as the telephone is to ours.

Nor is the social revolution limited to the most developed countries. Television, for example, lets people see how others live in distant countries and invites comparison. The information revolution is raising expectations not only in advanced nations but in corners of the world that have little experience of high technology itself.

These various dimensions—technological, economic, political, and social—are only a few ways of describing what the information revolution is about. Today, in the middle of the 1980s, the outlines of some broader implications are also becoming clear. I would like to reflect on some of the deeper economic and political challenges that the new age is bringing to us and then say a few words about America's response to them.

The Challenge to Individuals

First of all, any nation that wants to profit from the information revolution must understand where innovation comes from. In this era of rapid technological change, the pace of obsolescence is accelerating as never before. Innovation—and risktaking—are more than ever the engines of progress and success. This is true both in the economic marketplace and in the marketplace of ideas. So the challenge of economic success in this new age is, in large part, a challenge to the individual entrepreneur.

For obvious reasons, the free nations of the world are best positioned to meet this challenge. By their very nature, they guarantee the individual freedom that is necessary to the entrepreneurial spirit. And they have the confidence in their citizenry to encourage, rather than stifle, technological development.

In the United States, inventors, innovators, and entrepreneurs are symbols of our pioneering tradition. Our nation grew because there were enterprising Americans willing to take economic risks. A few statistics from our recent economic recovery tell the story. Last year over 666,000 new corporations were established in the United States—nearly 100,000 more than in 1981. Of these, some 50,000 failed—a dramatic measure of entrepreneurial spirit and the willingness to take risks.

We have also generated over 9 million new jobs in the past 5 years, reflecting the commercialization of new technologies. Our tax system encourages the economic risks that lead to innovation. In 1983 alone, we committed over $2.8 billion in venture capital to start-up costs. Public and private institutions alike encourage us to try the untried, to adapt ourselves to the unaccustomed.

And Americans as consumers are familiar and comfortable with technological innovation. Our fascination with gadgets and new products is legendary. From the days of the first automobile, Americans have been willing and eager for the novel, the improved, the latest model.

So we are disposed, as a people, to encourage entrepreneurship and to accept innovative technologies.

We have our qualms, of course. Like all other peoples, we have been sensitive to the impact of technological advance on the workplace—to the dislocations that follow from the replacement of manual labor. But, more than most nations, we tend to have confidence in our ability to resolve the social dilemmas that changing technologies present. Silicon Valley is only one symbol of our dedication to risk and reward. To us, the information age represents a new avenue to economic growth, an opportunity to do what we do best: to explore, to innovate, and, ultimately, to succeed.

The United States is far from alone, of course, in the development of new information technologies. France has pioneered the remarkable MINITEL system—a keyboard and TV screen linked to the phone system that now gives nearly 3 million subscribers instantaneous access to more than 1,200 different data bases, banking and financial services, press hookups, and educational and cultural channels. Such information technology gives the individual enormous personal outreach, expanding to global limits his access to information, ideas, and personal services.

Free Trade: The Challenge to the Free World

Success in the information age depends on more than our own innovation and entrepreneurship. The new age also presents us all with a global challenge. New technologies circumvent the borders and geographical barriers that have always divided one people from another. Thus, the market for these technologies depends to a great extent on the openness of *other* countries to the free flow of information.

Open markets allow comparative advantage to express itself. The United States, as a country that seeks to explore and trade in technological services, has always opposed international attempts to stifle the workings of the information revolution. In our view, every country willing to open itself to the free flow of information stands to benefit.

Some critics have charged us with simple self-interest. The United States, they say, urges open trade because it is so well positioned to profit from it. They point out that American research, development, and marketing can compete favorably with those of other countries.

The interesting thing about this charge is that it captures a truth, but it

expresses that truth exactly backwards. The United States does not advocate free trade because we are adept at pioneering technologies; we are adept at them *because* the dedication to freedom is intrinsic to our political culture. By maintaining that dedication throughout our history, we have been the pioneers of change both at home and abroad—in the agricultural phase of our development, in our industrial phase, and now, in the age of information.

Opposition to open trade is sometimes linked to a charge of cultural imperialism. The more international markets are open, it is said, the more smaller countries will be flooded with American movies and American television and radio programs—resulting in a kind of "cultural imperialism." I find this view ironic. If any nation would seem to be vulnerable to the widespread import of information and news from other cultures, it is the United States itself. As a nation of immigrants, we are the most international society on earth. Our cultural heritage—not to mention our cuisine—has been shaped by Asians, Europeans, Africans, and Latin Americans; by Christianity, Judaism, Islam, Buddhism, Hinduism; by almost every religious and ethnic influence imaginable. We urge would-be cultural imperialists to take note: the United States, with our international heritage, represents the largest market in the world for information from other cultures.

That international heritage is already encouraging foreign entrepreneurs. The Spanish International Network, for example, which is programed *outside* the United States, now has over 200 broadcast and cable outlets in our country. The United States does not fear an influx of information from other countries. On the contrary, we welcome it. And our reasons for welcoming it go beyond any simple adherence to the free flow of ideas and to open markets, beyond even the economic benefits that open trade would surely bring us. Those reasons go to the heart of the broad philosophical and political questions that the age of information has raised anew for all of us.

Fundamental Freedoms

The information age poses profound *political* challenges to nations everywhere. As any economist knows—or, for that matter, any alumnus of the Stanford Business School—the laws of economics do not exist in a vacuum. Even the most commonplace decisions—such as where to open a plant and when—must take into account social and political realities as well as economic considerations. Likewise, the freedom that makes America's economic success possible does not stand on its own; it is an integral part of our political system. So is the intellectual freedom that makes innovation and entrepreneurship possible.

The relationship between individual rights and economic dynamism is fundamental. The United States has seen that truth at work in our early agricultural age, in our age of industry, and in today's era of information. The Model T, the Wright brothers' plane, the telephone, the movie reel, the transistor radio, the VCR [video cassette recorder], the personal computer—these and other innovations have shaped and revolutionized our society. They have spread prosperity not just to an elite but to everyone. Thus, they mark the success of our democracy and the progress of our freedom. They are the material symbols of our dedication to individual choice, free enterprise, open markets, free scientific inquiry—indeed, to the very idea that the freedom of the individual, not the power of the state, is the proper foundation of society.

The same is true of free governments everywhere. The technological and economic successes of the entire free world are direct consequences and incontrovertible proof of the benefits that flow from self-government. The more the West dedicates itself to its freedoms, the stronger it becomes—both politically, as an attractive and viable alternative to statism, and economically, as a dynamic and expanding system of material productivity that brings benefits on a mass scale. In an era of technological revolution, our rededication to the liberty that makes innovation possible is imperative.

That rededication has strategic importance as well. The information revolution is already shifting the economic balance between East and West. The leaders of closed societies fear this shifting economic base, and for good reason. First, they are afraid that information technologies will undermine the state's control over its people—what they read, watch, hear, and aspire to. In most of these countries, familiar means of communication like the mimeograph machine and photocopier are already kept under lock and key. The specter of direct broadcast satellites alarms their leaders even more. In Moscow, they're paying up to 300 rubles—that's $450—for black market videotapes smuggled in from the West.

East-bloc leaders also fear that they will be unable to compete with the research, development, and marketing of information age technologies. Here, too, they are right to be worried. The incentive to improve information technology is unlikely to come from countries in which the pen is regarded as an instrument of subversion. The science and technology of the future will be directly tied to access to information, for the important scientific ideas will come from the accumulation and manipulation of data bases.

So these regimes face an agonizing choice: they can either open their societies to the freedoms necessary for the pursuit of technological advance, or they can risk falling even farther behind the West. But, in reality, they may not have a choice. The experience of the Chinese communists, who are now trying to release the talents of a billion people, will continue to be a fascinating test of whether a once-closed society can be opened.

That is why the promise of information technology is so profound. Its development not only strengthens the economic and political position of democracies: it provides a glimmer of hope that the suppressed millions of the unfree world will find their leaders forced to expand their liberties. But that is not all. If totalitarian leaders do loosen their grip in order to compete with the free countries, they may find themselves, in that process, contributing dramatically to an improvement in relations between East and West. That easing of tensions would benefit not only the Soviet Union and the United States but the nations across the globe whose destinies are linked to the East-West conflict.

The developing world, too, stands to benefit from an expanded flow of information. Some of these nations are already seizing their opportunities. I notice that Barbados, for instance, advertises to potential investors by emphasizing that it has a sophisticated telecommunications system. Other countries are using information technologies to enhance their agricultural or industrial capacities. With the aid of modern communications, Colombia now markets fresh-cut flowers in New York City. Developing countries that profited from the "green revolution" know that information modernization offers the vast promise of integration into the world economy.

Nations throughout the developing world must decide how to view these new international markets. If they fear outside influences and seek to restrain technological trade, they will only fall farther behind the developed world and increase the gulf between us. If, on the other hand, they remain open, they will find themselves rewarded with rare opportunities for developing their material and human resources and for accelerating their movement toward modernization.

In the industrially advanced world, the information revolution is already transforming the multinational corporation. Today, sophisticated communica-

tions enable people from across the oceans to work together with the same efficiency of those who work across town. In the coming years, we can expect to see new supranational corporate entities whose employees are drawn from all corners of the world. That's one possible consequence of the shrinking importance of geography. Another is that the developing nations will have access as never before to data and communications in the advanced nations—access that could only increase the efficiency with which developing nations use their resources.

A Test of Principle

Because of the information revolution, all nations—free and unfree, developing and developed—must confront a key challenge that I have already mentioned: the way nations trade with one another. None of the opportunities before us will bear fruit unless the free nations can agree to open rather than restrictive trade in these revolutionary products and services.

This same challenge is also affecting our diplomacy. Technologies are being transformed even as we negotiate over their transfer abroad. The United States has pressed strongly for a new round of multilateral trade negotiations in the GATT [General Agreement on Tariffs and Trade] to ensure that key issues relating to the trade in these emerging technologies are taken up. Meanwhile, we are keeping open the possibility of increasing bilateral free trade arrangements, as we are pursuing now with Israel and Canada. Our overall purpose remains the same: to maximize the development of and trade in these information age products and services, especially those that increase the free flow of data and ideas. To do otherwise would betray the vast promise that the information age holds out to us.

That betrayal would be a great misfortune for the free world—yes, because of the economic opportunities that would be lost but, more, because of the implications for the idea of freedom. We are proud of our freedom, and we are right to be proud. But today's disputes over the technologies that cut across our borders put our dedication and commitment to a new test. Are we secure enough in our principles to act in ways that promote, rather than discourage, the technologies that leap across borders?

The United States is confident in its own answer. We welcome these technologies as we have welcomed, in times past, other advances whose implications were uncertain. In fact, we invite other nations to practice a little "cultural imperialism" of their own on us. We weren't shaken when Mr. Gorbachev appeared live via satellite on our televisions. And it doesn't bother us to hear that engineers from the Soviet Union have been known to amuse themselves by intercepting Hollywood movies from American satellite transmissions. We just hope they enjoyed *Rambo*.

Approaching Horizons

This cultural dimension leads me to my final point. The greatest minds of the past century bent their powers toward understanding the significance of the industrial revolution. Theorists and intellectuals, novelists and poets alike devoted themselves to examining the dimensions of their new age. Today, with the passing of the industrial era, a new consciousness is developing. Its impact on our art and literature and music is already apparent; its impact on our social behavior is already underway. In the long run, the most exciting challenge posed by the new age is not to nations or corporations or societies but to the individual human imagination.

Meanwhile, those of us who must grapple with the daily realities of the information revolution face formidable challenges of our own. We can learn a practical lesson from a wise and thoughtful banker. Fifteen years ago, when even pocket calculators were a novelty, Walter Wriston foresaw the implications of this new age for the field of finance. His vision helped to revolutionize the entire financial industry and turned his company, Citicorp, into a giant of imagination and profit.

Wriston succeeded because he was able to grasp both the particular details of his chosen sector and the daunting conceptual outlines of the information revolution at large. By never losing sight of either, he contributed to both. Those of us who confront other practical dimensions of our new age—in my own case, the political dimension—can benefit from his example.

So, as we face the many challenges that the new age presents, we must never lose sight of our most fundamental principles. We are reminded with every advance that in this age of revolution our commitment to freedom is our single greatest asset. With all the information we have amassed, with all the discoveries at the frontiers of all the sciences, we still find that answers bring with them new questions. Our policies must always be based on the fundamental process of freedom—freedom of thought, freedom of research, and the free flow of ideas. If we keep that in mind, we will benefit from our dedication to liberty even as we secure it. ■

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